

THE
PSYCHOLOGICAL BULLETIN

I. GENERAL

313. TITCHENER, E. B., Wilhelm Wundt. *Amer. J. of Psychol.*, 1921, 32, 161-178.

In his *Beiträge zur Theorie der Sinneswahrnehmung* of 1862, Wundt set forth three ideas of first-rate importance which summarize his principal contributions: the idea of an experimental psychology, the idea of a social psychology, and the idea of a scientific metaphysics. These ideas were developed in his later writings. Wundt's work was at the same time both systematic and provisional. Although constantly changing his evidence of observed fact and his minor perspectives, as well as some of the larger theoretical considerations, he succumbed to the temptations of the systems after about 1874 and showed little inclination to revise his conceptual schemata. Wundt's achievements in the domain of experimental psychology consisted of the writing of an encyclopedic work of reference, the foundation of the first psychological laboratory, the establishment of a magazine of experimental psychology, and the introduction of demonstrational methods into the lecture-room. Wundt is the first figure in the history of thought whose temperament is that of the scientific psychologist. He is the founder, not of experimental psychology alone, but of psychology.

(There is appended a note on "Portraits of Wundt.")

RICH (Pittsburgh)

314. ENGLISH, H. B., In Aid of Introspection. *Amer. J. of Psychol.*, 1921, 32, 404-414.

Text-books of laboratory psychology fail to give the student instructions in the technique of introspection as a scientific method. The present paper, which is addressed primarily to the

student, aims to give such an account. Introspection involves, first of all, description of an experience in terms that resist further analysis. In addition to analytic description, processes that are rapidly changing need also to be described in terms indicating the sequences and order of the past processes. This description may, if necessary, be sacrificed to catch some fleeting and elusive experience. Interpretation of the experience should be included but sparingly, and always labeled as such, confining the report to the observer's experiences and avoiding the "stimulus error." "Putative recollection" is to be avoided. Description must necessarily be in terms of the attributes of mental process, which are separately discussed.

RICH (Pittsburgh)

315. PICARD, M., The Unity of Consciousness. *J. of Philos.*, 1921, 18, 346-356.

Great interest has always centered in the study of the unity of consciousness since the rise of modern psychology. James says "as a feeling feels, so is it." Stong claims that consciousness is something adventitious or on the other hand something added to the psychic states. James also says that the child's first conscious experience is "one great blooming buzzing confusion." It is possible for psychic states to exist in an "unfused" form. Attention modifies psychic states. Sensation is better defined as a "psychic state" rather than a conscious state. As a momentary expedient do we have integration of brain states and all neural activities of the brain are not correlated with the conscious state. Also specious fusions are possible. In short consciousness is a psychic concomitant of neural activities of a selective character and the selection is a device to supplement reflex actions where complete integration is impossible.

GARTH (Texas)

316. WOODBRIDGE, F. J. E., Mind Discerned. *J. of Philos.*, 1921, 18, 337-346.

The mind studied in psychology is the mind which remembers, imagines, perceives, reasons, etc., and above all is found in animal bodies, being biographical rather than transcendental, having genesis and origin. Its definition is biological, being looked upon in the way that life is regarded. It cannot be disembodied. The bodies of animals are the habitations of minds. Though they

who deal with psychology say that the natural history of mind keeps pace with the natural history of animal bodies, they have not succeeded in finding out when mind definitely enters body. The mind does not leave a body and enter on some appointed day. Seeing, thinking, etc., grow just as do digesting, walking and reproducing, it would seem. If animal bodies cease to be, digestion ceases to be. But this would not cause such chemistry to cease to be. Likewise thinking would cease if all animal bodies ceased and we should say that that which made thinking possible would not cease to be, for it is characteristic of the world when animal cannot exist. So mind in the transcendental sense has no genesis.

GARTH (Texas)

317. PERRY, R. B., A Behavioristic View of Purpose. *J. of Philos.*, 1921, 18, 85-105.

A determining tendency is a general response-system which has as its objective completion or self-renewal. The behaviorist has concluded that introspection is a poor place to begin in collection of data. Almost all recent progress in the motor-affective field has been due to disregard for introspection and parallelism. The unit-instinct of James is being discarded by some and Freud's "complex" is being adopted as is his "libido," having been freed from its excessively sexual meaning. Most human action instead of being "born outright" develops from some other implicit or partial state. It must be that synaptic resistances are lowered not only by past history but by present systematic readjustment and an organism in fact not only acts on its environment but even determines its own experience and fortune.

GARTH (Texas)

318. KANTOR, J. R., The Primary Data of Psychology. *J. of Philos.*, 1921, 18, 256-269.

We may think of the problem as an attempt to understand the nature of (1) stimulus, (2) response and (3) a segment of behavior.

Taking the last of these first, we may consider that the psychological unit may be called a "pattern of response," which though variable has a certain amount of uniformity. So-called illusions are simply situations in which reaction systems are called forth by appropriate stimuli. Besides the highly variable series of reactions we have the orderly and logically temporal series of reactions. As to stimulus, it is any object which can call forth a response in the

organism. And we may crudely classify all stimuli into natural, artificial and social. It is important to differentiate between objects and media of stimulation. We must in an objective study of human reactions study the stimuli and their setting for this will give an understanding of their inter-relations. There are stimuli for calling forth overt responses and those for inducing implicit responses.

Under the head of adjustment unit we must consider simple acts which unite to form large wholes, anticipatory and consummatory phases, and their integration. All the salient features of the response system are given by the writer in a table of nine items. Finally it may be said that psychological phenomena are the actions of a highly organized individual. The data of the science are therefore dynamic which are subject to precise natural description. But we may not hope to be as exact as those who deal with physical formulations.

GARTH (Texas)

319. PEARSON, K., Notes on the History of Correlation. *Biometrika*, 1920, 13, 25-45.

In the main, this article is a brief history of the Biometric School, with particular emphasis upon the work of Galton. Certain historical misconceptions, for which Pearson himself was responsible, are here corrected. To mention one only, Bravais should not be regarded as a contributor to the mathematical theory of correlation, as is implied in the frequently used phrase "Bravais-Pearson correlation coefficient."

BROWN (Michigan)

320. PEARSON, K., The Fundamental Problem of Practical Statistics. *Biometrika*, 1920, 13, 1-16.

If an "event" occurs p times in n trials, and we have no *a priori* knowledge of its frequency in the "total population of occurrences," what is the probability of its occurring r times in another series of m trials? Bayes' Theorem, reached after the assumption of "equal distribution of ignorance," has been rejected by Boole, Venn, and others, as a solution of this problem, because of this assumption. Pearson shows that Bayes' Theorem does not depend upon "equal distribution of ignorance," since the same result is reached if *any* continuous distribution is assumed. He then gives a development of the theorem, analogous to that of Laplace but more general,

with results again emphasizing the extreme limitations of the "normal" curve. The familiar "probability integral" ("normal" curve) is only a very special case of the incomplete Beta-function, which is the general probability integral.

BROWN (Michigan)

321. Editorial (PEARSON, K.), On the Probable Errors of Frequency Constants. Part III. *Biometrika*, 1920, 13, 113-132.

Parts I and II of this series dealt with probable errors of moments. This part deals with probable errors of medians, quartiles, and other constants involved in the grade or rank treatment of data. The general formulae, valid for any form of frequency distribution, are not likely to be practically usable to any extent. The special case of the normal distribution is treated at length (the normal curve is not discussed extensively because of any supposition that it is a universal law of distribution, but because of the mathematical difficulties arising in the discussion of other types of distribution) with results demonstrating the relatively great unreliability of medians, quartiles, etc. Formulae are given for determining more accurately than by the usual methods these constants, *provided* it is valid to assume normal distribution in the sampled population. But this will not often be, or, at least, be known to be the case, and means and standard deviations are indicated, by contrast, as the most reliable and most universally valid constants.

BROWN (Michigan)

2. NERVOUS SYSTEM

322. USHER, C. H., Histological Examination of an Adult Human Albino's Eyeball, with a note on Mesoblastic Pigmentation in Foetal Eyes. *Biometrika*, 1920, 13, 46-56.

Total absence of pigment in the eye cannot be used as a definition of human albinism, since four out of six eyes belonging to individuals determined as albinos "by the usual clinical characters" were found to have pigment. The absence or imperfect development of the fovea occurring in albinotic eyes may be the chief cause of defective vision and nystagmus in these cases.

BROWN (Michigan)

3. SENSATION AND PERCEPTION

323. KIESOW, F., Osservazioni sopra il rapporto tra due oggetti visti separatamente coi due occhi. *Arch. ital. di Psicol.*, 1, 1920, 3-38.

The author first discusses heteronomous doubling of images and the apparent paradox of the seeming transparency of the near object while the subject knows that it is actually solid. The experimental part of the paper deals with retinal rivalry which is the explanation given the first proposition. By means of the stereoscope both chromatic and achromatic stimuli are employed. The author finds that complete fusion is obtained if one eye is stimulated with white and the other with grey, but the resulting mixture is not the same as that obtained with a mixture of the same proportions on the color wheel. A certain amount of rivalry is obtained if the grey is darkened. Using the Kirschmann method, Kiesow works out the limen for rivalry. In the case of colors which are next each other in the spectrum, complete fusion was obtained in most cases. As the colors are more and more widely separated greater rivalry ensues. The author then set out to discover the relation between rivalry and the brightness of the colors employed. He finds that in the achromatic series the rivalry is developed slowly while in the chromatic series it develops relatively more rapidly. From these observations, Kiesow concludes that differences in brightness may be the cause of the slow development of the rivalry in the achromatic series but this does not explain the slow development in the chromatic series.

ELRINGTON (Washington)

324. FERREE, C. E., RAND, G., and BUCKLEY, D., A Study of Ocular Functions, with Special Reference to the Lookout and Signal Service of the Navy. *J. of Exper. Psychol.*, 1920, 3, 347-356.

Fitness for lookout and signal service work in the Navy, and for night flying in aviation depends to some extent upon keenness of discrimination at low degrees of illumination. There is a wide range of individual differences in the minimum illumination required for the discrimination of the test object, both before and after dark adaptation. This range reaches 657 per cent. The two eyes of the same observer require a different amount of light, ranging

from 19 to 54 per cent. of the amount required for the better eye. In only six per cent. of the cases was discrimination with the better eye more acute than with both eyes together.

BELL (New York University)

325. BILLS, M. A., The Lag of Visual Sensation in its Relation to Wave Lengths and Intensity of Light. *Psychol. Mono.*, 1920, 28, No. 5, 101 pp.

In an excellent monograph from the Bryn Mawr laboratory, Bills directs attention to the rise of the visual sense with time, need for the study having become increasingly evident from studies in methods of photometry carried on by Ferree and Rand. The author first discusses the various direct methods used in the determination of the lag, by such men as Swan, Charpentier, Lough, Broca, Sulzer, Martius, Buchner, and Berlina, and also men like Exner, Lamansky, Kunkel, Dürr and MacDougall, who used an indirect method. Conclusion is drawn that results differ regarding the time required for different color sensations to reach their maximum, for colorless sensations to reach maximum, and for the effect of the intensity of light on the time required. Bills attempts to reexamine these older methods so far as possible, and to so standardize the determination of the relative lag of colored and colorless sensations, that these can be reproduced at will. The apparatus employed makes possible, (a) obtaining two stimuli and varying their intensity and (b) the presentation of these stimuli to the eye with controlled exposure time. The spectroscope apparatus earlier described by Ferree and Rand satisfies the first demand, a unique lens system, exposure apparatus and stimulus box, the second. The equality of brightness method, just noticeable differences, and several new methods were employed. Of these latter, the one where the sensation in its rise towards the maximum is graded in terms of just noticeable differences, these just noticeable differences being produced by changes in the time of exposure with the intensity of light kept constant throughout, produces the best results and is apparently the most promising for general laboratory purposes.

Quite apart from methodological interests the research finds a different rate of rise of sensation for different wave lengths and for white light showing the retina not only selective in the amount of its response to wave length but also in the lag it shows in giving its full response. With the highest intensity of light used, the order

of rate of rise by the best method, from fastest to slowest up to within two just noticeable differences of the maximum for green, was green, yellow, white and red, with blue not being employed. With the lowest intensity of light used, the order was yellow, red blue, green and white. With increase of intensity of light there was a decrease in the time required to produce the maximum response, this decrease being more rapid for green and blue and slower for red and yellow.

PECHSTEIN (Rochester)

326. WINFIELD, M., and STRONG, C., The Hering Color-Blindness Apparatus and the Normal Rayleigh Equation. *Amer. J. of Psychol.*, 1921, 32, 425-428.

Matches of spectral red and green to yellow, the normal Rayleigh equation, upon the Hering color-blindness apparatus, were obtained from one hundred subjects picked at random in order to determine the capabilities of the instrument and the range and distribution of the matches among normal O's. The instrument was found to be accurate and readable to within 1° , but a change of less than this amount frequently destroyed a match. The amounts of G required to equate R to Y by the 100 normal O's varied from 45° to 52° , with an average of 48.48° . The *m*'s from the averages of the ten matches taken for each O were small, averaging 0.7° . Nine cases fell beyond 52° , but they were all abnormal.

RICH (Pittsburgh)

327. THALMAN, W. A., The After-Effect of Seen Movement when the Whole Visual Field is Filled by a Moving Stimulus. *Amer. J. of Psychol.*, 1921, 32, 429-441.

Wohlgemuth reported an experiment upon the after-effect of movement when the whole visual field is filled by objective movement, with negative results, but neglected these results in relating his theory to the facts. His observations were repeated and his apparatus found to be unsuited to the problem. Yet even with it the after-effect was reported in a large percentage of cases. A large cylinder was constructed to meet the requirements of complete visual stimulation, and it was found that when the whole visual field is filled by an objectively moving stimulus the after-effect was observed. In producing the after-effect, position of fixation and, within limits, rate of objective movement were irrelevant factors, and the conditioning factor was the duration of stimulation.

RICH (Pittsburgh)

328. BISHOP, H. G., An Experimental Investigation of the Positive After-Image in Audition. *Amer. J. of Psychol.*, 1921, 32, 305-325.

The experiments aimed to find out if there is a positive auditory after-image, analogous to the positive after-image in vision. The sources of tone were Stern variators, with tube transmission, and vibrating telephone receivers. A signal was given at the instant at which the vibrations ceased, and the observers instructed to report any tonal sensation following the signal. The tones from the variators were stopped at first by cutting off the air, and later by breaking the path of conduction, while the tones from the telephone receivers were stopped by breaking the current through the receivers. No positive after-image of tone was found. With all forms of apparatus used a "modified ending" of the tones frequently occurred. This "modified ending" is probably a compound effect, due in part to tonal *Abklingen*, in larger part to the objective conditions of the experimental arrangement. Its intensity depends upon intensity of stimulus; its vividness on insistence upon pressure in the ear, which increases with intensity and duration of stimulus.

RICH (Pittsburgh)

329. ELRINGTON, G. A., L'espressione delgi intervalli musicali. *Arch. ital. di Psicol.*, 1, 1920, 77-93.

Using an Appum Tonmesser, a series of musical intervals was presented to each of five subjects, who were requested to write down immediately, what the tones seemed to convey in the way of ideas, sentiments and the like. In the analysis of the results, the intervals were grouped according to the respective distances of the tones composing them. A series was thus obtained ranging from the minor second to the twelfth. Each group of intervals was seen to have a fairly definite character, more marked in some than in others. There seems to be a considerable degree of uniformity among the subjects, in their reactions to the intervals. The specific responses to the tones contain principally affective elements. Expressions of pain, sorrow, joy, restlessness, anxiety, order, doubts and the like were given in the protocols. The distance separating the component tones seems to be the factor to be considered. The greater the distance the more difficult appears to be the interpretation of the interval. In a series of experiments complete introspections were taken from three of the subjects and these furnish details of the

attitude of the subject to the interval presented, and of the mental processes involved in coming to a decision. Wide individual differences were here found.

ELRINGTON (Washington)

330. RICH, G. J., A Note on "Vocality." *Amer. J. of Psychol.*, 1921, 32, 446-447.

RICH (Pittsburgh)

331. TUNG, S., The Integration of Punctiform Cold and Pressure. *Amer. J. of Psychol.*, 1921, 32, 421-424.

Simultaneous excitation of punctiform cold and pressure was first produced by stimulating with a cold-paint spots that responded both to pressure and to cold. Two qualities of cold were distinguished, a superficial "wet" cold and a "just cold" deep and penetrating. Discrete pressure and cold spots were then stimulated. A "wet" cold frequently resulted, but its duration was too brief for qualitative description.

RICH (Pittsburgh)

332. BRADDOCK, C., An Experimental Study of Cutaneous Imagery. *Amer. J. of Psychol.*, 1921, 32, 415-421.

The observers were first given sensory cutaneous experiences and then asked to "think of" the one of these experiences. They were later asked to realize familiar situations in which an image of pressure, cold or warmth might be expected to appear. Cutaneous images appeared rarely, and then were undoubtedly tied and not free. Many experiences reported as images were probably sensory, the sort of pressures and temperatures sensed when one attends keenly to a given part of the skin.

RICH (Pittsburgh)

333. LAIRD, D. A., Subcutaneous Sensations. *A. Jour. of Psychol.*, 32, 1921, 302-304.

An accident resulted in laying bare the muscles of the fingers. The sensations resulting from direct stimulation of the muscles were carefully observed and compared with those obtained by pressure upon the anaesthetized skin.

RICH (Pittsburgh)

334. GEMELLI, A., TESSIER, G., and GALLI, A., La percezione della posizione del nostro corpo e dei suoi spostamenti. Contributo alla psicofisiologia dell'aviatore. *Arch. ital. di Psicol.*, **I**, 1920, 107-182.

A study of the perception of the position of the body in space and of its displacements with a view of obtaining positive criteria of practical utility in the selection of aviators. Data were sought as to the capacity of the individual to estimate the direction and the amount of the displacement of the body. The subject could be moved at different speeds to either side, forward, backward or in a circular direction. The reaction times for the making of the judgments and the amount of error were electrically recorded. In the first part of the experiment, the subjects corrected the displacement by means of a special device. Introspective accounts were also furnished. The second group of experiments had to do with displacements from the vertical. Displacements were more easily perceived when they had a lateral rather than a longitudinal direction; and forward rather than backward. Rotating movements were very inexactly estimated. The reaction times are more rapid for lateral than for longitudinal and rotating movements. Differences in the rapidity of the movements influence the results tremendously. The delicacy of the perception of the displacement is greatly reduced when the body of the subject is immobilized so as to exclude the participation of the kinaesthetic sensations and of those coming from movements of the head. The influence of kinaesthetic sensations is not so evident in the case of rotary movements. Finally these results are discussed in the light of the theory of the function of the labyrinthine sensations. They agree with Bourdon that it is not possible to attribute the perception of the displacement of the body solely to the functions of a specific organ. The phenomena turns out to be very complex and sensations from many parts of the body enter into it.

ELRINGTON (Washington)

4. FEELING AND EMOTION

335. BUSCAINO, V. M., Rapporte tra stato subiettivo e manifestazione somatiche netta dottrina delle emozioni. I centri encefalici dei riflessi emotivi. *Riv. di Psicol.*, **16**, 1920, 167-177.

The author brings forth a great deal of clinical and experimental evidence in support of the somatic theory of the emotions as opposed

to an intellectualistic or a cortical variation theory. In tracing the history of the somatic theory he finds that the elements of such an explanation go back to Aristotle and are found clearly in Schopenhauer and Thomas Hobbes, hence, attributing this theory to James and Lange is erroneous. The author then advances a somatic theory the principal variation of which with the existing explanations is the emphasis of cerebral but sub-cortical emotional reflexes.

ELRINGTON (Washington)

336. WASHBURN, M. F., and GROSE, S. L., Voluntary Control of Likes and Dislikes; The Effects of an Attempt Voluntarily to Change the Affective Value of Colors. *Amer. Jour. of Psychol.*, 1921, 32, 284-289.

The 53 observers were asked to judge the affective value of each of 18 colors upon a scale of 7 judgments ranging from "very pleasant" to "very unpleasant." They were then asked to attempt to like an unpleasant or dislike a pleasant color, and make a new judgment. Two months later they were again asked to make single affective judgments. In all but 6.3 per cent. of the experiments, the observers were able to change their judgments of the colors, the extreme judgments being the most difficult to change. It was easier to change in the direction of unpleasantness than in that of pleasantness, but the latter changes were the more permanent of the two. The most frequent method of bringing about the change was to imagine the color in some new context.

RICH (Pittsburgh)

337. PICARD, M., The Coordinate Character of Feeling and Cognition. *J. of Philos.*, 1921, 18, 288-295.

It is said that feeling states are abolished when attended to. This cannot be the case. Wohlgemuth found that the more a feeling is attended to the clearer it becomes. Also he finds feelings are localizable. The relation of feeling to cognition must be discovered by introspective methods for there are no two neural bases to which cognition and feeling may separately be referred. There is no doubt that introspection discloses a *pleasure* or *displeasure* tone in any conscious state or both. Likewise cognition is always present. On this footing of "ever present" they are coordinate and this is more significant than arguments adduced for attention and localizability.

GARTH (Texas)

338. YOKOYAMA, M., The Nature of the Affective Judgment in the Method of Paired Comparisons, *Amer. J. of Psychol.*, 1921, 32, 357-369.

The introspective reports from a study of affection by the method of paired comparisons were analysed with a view to raising the question as to whether this method gives anything more than affective meanings. Pleasantness and unpleasantness may be meanings for any of the four observers; for two observers they are always meanings, and for the remaining two they are occasionally meanings. Organic sensory content is the *sine quo non* of P and U except in advanced stages of degeneration. Conscious P and U drop away from the affective perception in the course of its decay, concomitant with the diminution or disappearance of the sensory organic contents of consciousness. P and U are, thus, most universally and definitely stateable as meanings, and are, on the side of process, predominantly sensory.

RICH (Pittsburgh)

339. GRIFFITTS, C. H., Results of Some Experiments on Affection, Distribution of Associations and Recall. *J. of Exper. Psychol.*, 1920, 3, 447-464.

Are disagreeable experiences repressed and agreeable ones more frequently recalled? What relation has this to the mood and temperament of the individual? In the present experiment lists of 50 and 100 words (nouns and adjectives) were presented to each of 60 subjects. As each word was pronounced the subject was to wait until it suggested some previous experience, to write down some word as a clue to that experience, and to indicate whether the experience was pleasant, unpleasant, or indifferent. After the experiment was completed and about an hour had been devoted to other work, the subjects were unexpectedly asked to write as many of the stimulus words as they could remember. In every case there were more pleasant than unpleasant associations. Adjectives have a greater recall potency than nouns. There is no evidence of repression of stimulus words arousing unpleasant associations, but it is true that a greater per cent. of the words arousing pleasant associations were recalled than of those arousing unpleasant associations. The ratio of pleasant to unpleasant associations showed a correlation of .47 with self-estimates of cheerfulness.

BELL (New York University)

5. MOTOR PHENOMENA AND ACTION

340. ANTONINI, G., L'educazione della volonta. *Riv. di Psicol.*, 16, 1920, 178-188.

Education, both in the family and in the school, must be freed from its traditional pedantry and placed on a footing which will develop the individual's own experience, critical faculties and power of acting for himself. To educate the will the positive acquisitions of physiology and of experimental psychology, which have already begun to inform modern pedagogy, need to be applied. The author sketches a program which may be effectively carried out.

ELRINGTON (Washington)

341. DEL GRECO, F., Il "momento" nella genesi delle nostri azioni. *Riv. di Psicol.*, 16, 1920, 154-166.

The author considers the precise importance of the "moment" in the genesis of human actions. Motives for action are analysed and the bases for action are found to be exceedingly complex. The author concludes that, taking all sides of the problem into consideration, a conceptual synthesis is possible but very difficult. The difficulty is that human personality, which turns out to be one of the very largest factors, cannot be analysed or broken into parts.

ELRINGTON (Washington)

342. RONCAGLI, V., Richerche sperimentali col metodo del Labirinto. *Arch. ital. di Psicol.*, 1, 1920, 57-76.

Maze experiment on one adult and an abnormal and normal human child for learning capacities and capacity for retention. Four types of maze were employed of progressively increasing difficulty. Learning periods were divided into two groups with 68 days interval between. Introspections reveal that in the normal subject, learning is of a semi-automatic character,—use is made most frequently of motor images. The sense of error is an important factor. In the abnormal subject, little profit is derived from previous mistakes. For him the learning is more or less of a chance character like the learning of animals. In the normal subject, orientation is voluntary while in the abnormal subject it is involuntary. As compared with the normal, the abnormal subject learns more slowly, is less attentive, his memory is less exact and less continuous and he retains the solution less well.

ELRINGTON (Washington)

343. GATEWOOD, E. L., Individual Differences in Finger Reactions. *Psychol. Mono.*, 1921, 28, No. 4, 43 pp.

The investigation has to do with the speed and accuracy of finger reactions of the two hands in response to visual stimuli, the experimenter believing such an investigation of importance for the improvement of piano instruction. The apparatus employed is a complex form of the reaction time mechanism with elaborate electrical connections. Fifteen right-handed adults are employed as subjects, some being expert piano players. The results of several thousand reactions show that individuals differ both in speed and accuracy. There are some individuals who with unlimited practice will not attain the speed and accuracy others show at the initial trial. With very few exceptions, subjects agree that greatest speed is attained when using two hands, *i. e.*, one finger on each, and the lowest speed is obtained when both fingers used are members of the left hand. The same is true for accuracy. Trained subjects (those having a considerable amount of piano and other similar practice) show less difference between fingers than do the untrained subjects.

PECHSTEIN (Rochester)

344. ARPS, G. F., Work with Knowledge of Results versus Work Without Knowledge of Results. Awareness and Partial Awareness as Factors Conditioning Efficiency. *Psychol. Mono.*, 1920, 28, No. 3, 41 pp.

Arps' object is to determine "whether a condition of relatively complete awareness of results is more or less favorable than a condition of partial awareness." In ergograph experiments various series of ascending and descending, known and unknown weights are employed. The rates for both the known and unknown series are recorded as well as the amount of work. In both cases the conditions with knowledge of results exceed those without knowledge of results. Arps holds that will power is inadequate to explain the efficiency differences, these more probably being explainable in that the conditions in the known work produce greater functional changes in the central nervous system than the unknown conditions do, hence resulting a better maintenance of attention and increased muscular efficiency. When work is long continued and to the point of exhaustion sudden recovery occurs, a plausible explanation assignable being the attainment of a functional grouping of the neurones connected with the group of muscles involved in lifting the ergographic load.

PECHSTEIN (Rochester)

345. SNODDY, G. S., An Experimental Analysis of a Case of Trial and Error Learning in the Human Subject. *Psychol. Mono.*, 1920, 28, No. 1, 78 pp.

Snoddy makes a detailed analysis of trial and error learning in the case of tracing a six-pointed star by mirror reflection. It is pointed out that the two important objective factors in learning are varied instructions given to the learner and the controlled temporal distribution of practice. Analysis of learning records reveals the fact that in every respect mirror tracing of this type is of the true trial and error sort, with the learner soon abandoning any attempt to reason out the true directions of the grooves. "The study revealed at every point the behavioristic nature of this type of learning." It is shown that the mental image of a movement in mirror tracing cannot control a movement; that the value of the instructions given the learner depends upon the type of practice under which the learner is working; that recess period practice makes accuracy possible, and series practice makes speed possible.

PECHSTEIN (Rochester)

6. ATTENTION, MEMORY AND THOUGHT

346. GEMELLI, A., and GALLI, A., Recherche sull'Attenzione. Nota Prima. Un nuovo metodo per lo studio delle oscillazioni dell'attenzione. *Arch. ital. di Psicol.*, 1, 1920, 39-56.

The authors describe a new method for studying the fluctuations of attention. Simple optical stimuli pass before the subject at the rate of about 200 every 30 seconds. The reaction time for the recognition of each stimulus is taken by means of graphic records. From these data, the authors are able to obtain information regarding the subject's capacity for maintaining attention to an optical stimulus. Individual differences and types of attention are evident from this work.

ELRINGTON (Washington)

347. MORGAN, J. J. B., The Effect of Fatigue on Attention. *J. of Exp. Psychol.*, 1920, 3, 319-333.

Five high school students, who had no knowledge of German, learned the English equivalents of 850 German words in one sitting of about four hours. Each pair of words was presented four times. Two days later recognition, recall and retention tests were given to determine the persistence of the associations. The curve of learning efficiency remains practically level. There is a slight drop

in the middle, followed by a slight rise at the end. Of the material learned in the latter part of the experiment eighteen per cent. less is retained than of that learned in the first part. Recognition of the material used in the early part of the learning period is much superior to that of material used in the latter part. This indicates that adaptation to fatigue involves a narrowing of neural activity to the specific process demanding adaptation.

BELL (New York University)

348. THIELE, N., *Wie begegne ich den Gefahren meines Berufs?* *Praktische Psychol.*, 1921, 2.

This is purely a case study in which the testimony and observations of about seventy-five individuals are reported verbatim with brief comments by the compiler. It has a certain suggestive value for applied psychologists, but its implications are not clearly indicated and no practical conclusions are drawn.

LINK (New York)

349. PRESSEY, S. L., *The Influence of Color upon Mental and Motor Efficiency.* *Amer. J. of Psychol.*, 1921, 32, 326-356.

The subjects of this experiment were given a number of non-visual tests in a room illuminated at various times by three hues (blue, green and red) at each of three intensities. The tests used were tapping, pulse and respiration, estimates of pressure, judgments of the pleasantness of touch substances, multiplication of one-place by two-place numbers, free association, immediate memory for nonsense syllables, and continuous choice reaction. Introspective reports of the effect of the colors were also obtained. Results with the tapping, multiplication and continuous reaction tests suggest a decrease in function under dim, and an increase under bright light, but the remaining tests failed to show any effect of brightness. The objective measurements showed no effect of hue, independent of brightness, upon the function tested. The introspective reports showed marked variability and also a decrease in affective reaction to both hue and brightness, with habituation.

RICH (Pittsburgh)

350. AUSTIN, S. D. M., *A Study in Logical Memory.* *Amer. J. of Psychol.*, 1921, 32, 370-403.

This investigation was undertaken to see if certain of the laws established for the recall of nonsense material held for sense or

logical material as well, with special emphasis upon the effect of distributed repetitions and the influence of time, curve of forgetting. Each of the five observers was given two kinds of logical material with which he was relatively unfamiliar but in which he was interested to some extent, the material differing from observer to observer. All material was learned for five repetitions, and memory was tested both by the percentage of ideas freely recalled and by the percentage recalled under questioning. Divided repetitions, within limits, proved more effective than cumulative repetitions, especially when the material was tested two to four weeks after learning. For immediate recall, cumulative repetitions proved as effective as repetitions that were distributed. The forgetting of logical materials is rapid at first and then proceeds more slowly, as with nonsense syllables.

RICH (Pittsburgh)

351. BORING, E. G., Consciousness in the Siamese Twins. *Amer. J. of Psychol.*, 1921, 32, 448.

Bolton's account of the Siamese Twins suggests an overlapping of consciousness which is not unlike the overlapping of two hysterically separated consciousnesses.

RICH (Pittsburgh)

352. BODE, B. H., Intelligence and Behavior. *J. of Philos.*, 1921, 18, 10-17.

Bearing in mind that attention may be coexistent with consciousness, we may distinguish between conscious and mechanical behavior if we grant that intelligent behavior (conscious) is "forwardlooking." The psychic is an aspect in causation. We may not get off the plane of mechanistic naturalism unless we find a new interpretation to conscious behavior. There seems no escape from the mind-body problem if mind is what it has been supposed to be in the past, otherwise the road may lead around the psychophysical, as James suggests, instead of through it.

GARTH (Texas)

353. PERRY, R. B., The Independent Variability of Purpose and Belief. *J. of Philos.*, 1921, 18, 169-180.

Common sense assumes the independence of these two factors, purpose and belief. Interest and belief have in common an anticipatory set or "supposition" which may be qualified as a belief or a purpose. The former of these is a supposition to which one has

committed himself, a belief; and the latter is a situation in which the matter has gone past the point of being merely a belief but has now become an anticipation and is correlated with a specific occasion. We may have the case in which (1) belief is fixed and purpose varies, (2) stability of purpose and variability of belief, and (3) a positive tendency to response which never finds expression.

GARTH (Texas)

354. KANTOR, J. R., An Objective Interpretation of Meanings. *Amer. J. of Psychol.*, 1921, 32, 231-248.

The objective psychologist regards a meaning as an act or adjustment of the person which conditions another and following reaction. When we develop a differential reaction to an object in a given setting, we have appraised and evaluated it from the standpoint of behavior. This reaction may be either explicit and observable or implicit and non-observable. It may be a reaction to present stimuli or a detached reaction system functioning in memory and thought processes. Images are to be considered as detached reaction systems and may thus be meanings. The meaning-reactions are representative (similar to one performed on a previous occasion) or substitutive (purely symbolic). Between the two extreme types stand the language responses. Concepts are reaction systems that make use of large segments of past experience. Language is to be considered essentially as a determiner of action, and it thus functions efficiently as a meaning-reaction.

RICH (Pittsburgh)

355. COMSTOCK, C., On the Relevancy of Imagery to the Processes of Thought. *Amer. J. of Psychol.*, 1921, 32, 196-230.

These experiments were designed to answer the question of the relevancy of the imagery reported in the analysis of conscious attitudes. In the first part of the investigation, the observers were given problems to solve, and required to report the experiences upon which the solution was based. Imagery, which was always found to be relevant, was used in all save a few sensori-motor responses. In the second part of the work, the experimental situation was simplified, and similar results obtained. The third section of the experiment involved the introduction of irrelevant material into a problem in sorting or reading, and showed that a marked irrelevancy is characterized by feeling accompanying the

inhibition set up; and that where the irrelevancy is less marked, it tends to be overlooked because of the set for relevant meanings. In the final portion of the work, vivid imagery was set up by means of ideation of pictures, solution of completion tests, or imaginal reaction to three words, and the solution of a logically irrelevant problem was superimposed upon this imagery. If the imagery could be used as a whole or in part, it remained; otherwise it dropped out. All of the experimental work led to the conclusion that there is no irrelevant imagery. When imagery is present, it is relevant.

RICH (Pittsburgh)

356. RAYNER, H., Temperament. *J. of Ment. Sci.*, 1921, 67, 151-162.

Temperament is a subject which formerly occupied an important place in medical literature. Recently, however, it has been greatly neglected. Medico-psychologists have tried to define it, but without any attempt at practical application in treatment or prognosis.

Maudsley pointed out that it would be of vast service "to set forth in formal exposition the quick process by which the shrewd and experienced man of the world intuitively judges the character of those he has to do with, and refers them in a moment, instinctively, to their proper classes in his mind."

The author summarizes and discusses the conception of temperament as held by Hippocrates, Galen, Richerand, Georg, Wundt, Lotze, Comte, Perez, Ladd, Armstrong-Jones, James Ward, Laycock, and Jonathan Hutchinson.

The conclusion is that "temperaments are not dependent on the organization of the brain or nervous system, or even of its autonomic portion, nor on the endocrine glands, but are due to somatic elements. That these somatic characters are not so organic as to be inevitably inherited, but are modifiable by protracted variation of nutrition within the limits of normality, either during gestation or in after-life, and probably also even under certain conditions of disease."

LEAMING (Pennsylvania)

357. PECHSTEIN, L. A., Massed *vs.* Distributed Effort in Learning. *J. of Educ. Psychol.*, 1921, 12, 92-98.

The question of massed *vs.* distributed effort is studied in connection with that of learning by wholes and by parts. Motor learning of mazes by rats and humans provided the material for

the following conclusions: (1) When the problem is short, massed effort is more economical. (2) In connecting short maze problems already learned, massed effort is more economical provided the problems were originally learned that way. (3) The longer and more difficult the problem, the more advisable is it to break up the problem into smaller units. These units should be learned by massed effort, and should later be connected by massed effort. That is, division of difficult material into parts with massed effort in learning them is most economical. An explanation of these conclusions is offered in terms of two principles called elimination and mechanization. The first term includes more than elimination, namely, detecting critical points in the problem, careful study of details, etc. The second includes the formation and strengthening of the right bonds.

POFFENBERGER (Columbia)

358. SKAGGS., E. B., The Relative Value of Grouped and Interspersed Recitations. *J. of Exper. Psychol.*, 1920, 3, 424-446.

Reading and attempting to reproduce what has been read has been found by several investigators to be a more economical method of learning than mere reading alone. The question arises what is the most favorable combination of readings and recitations? Four different combinations were used in the experiment, and both nonsense syllables and poetry were employed as learning material. In all cases the interspersed method, in which a reading is immediately followed by an attempt at recitation, gave the best results.

BELL (New York University)

359. O'BRIEN, F. J., A Qualitative Investigation of the Effect of Mode of Presentation upon the Process of Learning. *Amer. J. of Psychol.*, 1921, 32, 249-283.

The observers learned to complete mastery series of four-letter words or nonsense-syllables. Twelve modes of presentation were employed, involving various combinations of visual, auditory, vocimotor, and manumotor presentation. Introspective reports were taken of the processes of learning, immediate recall, and recall after 24 hours. Of the seven observers, one was of the extreme motor type, one of the extreme visual type, and the others of mixed types. The process of learning was found to consist of three distinct stages: (a) the orienting stage; (b) the stage of attempted anticipation; and (c) the anticipatory stage. All of the O's found it necessary to employ vocimotor imagery during the

first stage, and the O's of the motor type had to use it throughout the process of learning. If the O was instructed not to use vocimotor imagery, he either attempted actively to inhibit it, thus interfering with or preventing learning, or set himself to use some other form of imagery. The words or syllables were usually grouped in learning. Manumotor imagery did not aid either learning or recall. During auditory presentations, writing the material helped O only in making definite the auditory perception. The modality of imagery used in learning depended primarily upon O's ideational type, only secondarily upon the mode of presentation. A visual kinaesthetic, or rhythmic schema usually preceded the recall of difficult words. Visual imagery proved unsuitable for rapid anticipation, and under such requirements usually gave way to vocimotor imagery.

RICH (Pittsburgh)

7. SOCIAL FUNCTIONS OF THE INDIVIDUAL

360. LEUBA, J. H., The Meaning of "Religion" and the Place of Mysticism in Religious Life. *J. of Philos.*, 1921, 18, 57-67.

To say whoever seeks the welfare of society is religious would be to fail to recognize the difference in attitude psychologically of the adherents of any organized religion from that of the devoted atheistical worker. If "religion" were used as a word denoting all social forms of conduct we should need a new word for those forms involving belief in superhuman beings. Magic is to be differentiated from social behavior and religious behavior. Mystical experience is not at the root of all religions; it is just one type of religious relation. Mysticism finds some difficulty in existing in a highly organized religious environment because of its individualism. The old Romans were practically free from mysticism and regarded their gods objectively.

GARTH (Texas)

361. DOCKERAY, F. C., and ISAACS, S., Psychological Research in Aviation in Italy, France, England, and the American Expeditionary Forces. *J. of Comp. Psychol.*, 1921, 1, 115-148.

Psychology well needs to thank its stars that the World War came, and that it brought demands, situations, problems, apparatus, contacts of national and international scope, herds of men gathered together, and dynamic interest in technical and practical pursuits of a psychological nature. It meant the salvaging of a great many

experiments in psychology, not that the reviewer believes the experiments in question deserved their temporary interment, but, because of various tendencies, so many workers in the field had lost faith in quite a few very reputable and very valuable experiments and the technique they entail. Reference is here being made most specifically to the reaction-time experiment for one, salvaged by the workers on aviation problems. And new experiments with new techniques were fashioned and new combinations of old techniques were instituted. What experiments were designed and performed to meet the requirements attending the classification of aviators and prospective aviators in Italy, France, England, and this country during the war are admirably and extensively described by Dockeray and Isaacs in this article, the summary being an excellent review of the foreign and domestic literature on the subject. The writers begin by describing the work of the psychologists, Gradenigo, Saffiotti, Azzi, Gemelli, Romagna-Manoia, Aggazzotti, Galeotti, Cacciapuoti, Herlitzka, Malan and Bilancioni, of the laboratories in Rome, Turin and Naples. Various techniques were established to test visual, auditory, and tactual reaction-times; choice reactions and choice reaction-times; nervous exhaustion and capacity for attention; emotional reaction, particularly in pulse, blood-pressure, volume, steadiness; effects of emotional stimulus on reaction-time and choice reactions; concentration of visual perceptual attention; range of attention tachistoscopically manipulated; speed of visual perception; perception of muscular effort; vertigo in changes in equilibrium, compensatory movements, ability to recover visual and motor orientation, and the condition of consciousness during vertigo and just following it. Many and exceedingly interesting results of the experiments, most of them obtained from numerous subjects, are cited, but they are too numerous and too well organized in the writers' summary to enumerate here. Two large results were the following: (1) Practically all of the best pursuit pilots belonged to the sensory reaction-time type, and exhibited a keen perception of the position of the body, low visual reaction-times, low choice reaction-times, and a low average deviation in reaction-time. Resistance to influences of emotional stimuli was not always present or necessary, some of the best pilots being quite susceptible to emotional conditions. (2) Practically all of the best slow machine, bombing, aviators were motors in reaction-time; and Caproni pilots exhibited resistance to emotional stimuli.

In France, most, if not all, of the work on aviators was done by Camus and Nepper. Tests of reaction-time, especially as to the

effects of nervous stress, shock, and drugs on reaction-time, were made, and also tests of an emotional nature similar to those made by the Italians but with correlations with reaction-time results. On the basis of these two sorts of tests, candidates were divided into five classes, the first three of which were considered acceptable for admission to service and the groups four and five were rejected.

The British research was confined almost entirely to physiological experiments and the corresponding data, such as pulse, blood pressure, vital capacity, etc., although manometer tests of volition, the MacDougall dotting test of speed and accuracy of eye-hand-motor coordination, tests of tremor and giddiness, and studies of flying temperament all have a psychological flavor and value. The work was effected through the guidance of Head, Rivers, Fletcher, Greenwood, Hill, Sherrington, Spearman, Flack, Dreyer, Birley, McDougall, Heald, and Bowdler. Deserving of special mention were the British studies of vertigo and fainting, and the stress placed on such tests as walking a straight line heel to toe, turning on one foot, standing on one foot for fifteen seconds, balancing a rod on a flat board, etc.

The article under review ends with a comprehensive exposition of the work done in the American Expeditionary Forces, at Issoudun and Tours, on returning tried-out aviators and students in the aviation camps. The research consisted in tests of mental and behavior capacities and the effects produced in them by deprivation of oxygen in rebreathing; tests in reaction-time; differences in reaction-time exhibited by Chasse fit and unfit pilots and Moniteurs; correlations of training department ratings with reaction-time scores; steadiness tests much like the Whipple metal punching board steadiness test. The most ingenious test was that of the aviator's ability to visually observe a great many objects in their true orders and arrangements and immediately to reproduce his impressions accurately on prepared maps or graph sheets; the object was of course to try to reproduce as nearly as possible the conditions, demands, and difficulties encountered by the cloud pilot who did reconnaissance work over and behind the enemy lines, and who by his job was required to observe quickly, in detail, accurately, and widely, and who had to manipulate his machine for a return journey, and for safety as well, while trying to retain the observations he had made. In this experiment a modified tachistoscopic slide apparatus was used; the observer manipulated the exposure time of the slide but the experimenter kept records of

this time and also of the time required for the reproduction as well as the observer's estimate of the correctness of his recall. A recognition device was inserted after a given slide was noted and the observer had to state, in regard to each of twelve slides, whether it was the same or different from the one he had noted previously. Some very interesting results and correlations are given. Finally, personality ratings of aviators were made by an investigator, himself an aviator of flying status, living with the aviators in their bivouacs and following them in their haunts. No general rules resulted however from such personality studies, except the statement that quiet, methodical men were among the best flyers, and that intelligence, the power to make quick adjustments to a new situation, and good judgment were essential in the career of an aviator. The nervous and high-strung individuals or the temperamental were the least reliable because they frequently became psychotic under stress.

The article contains a short but valuable bibliography of the most up-to-date published works dealing with psychological experimentation in aviation problems.

CROSLAND (Oregon)

362. MENZEL, M., Beiträge zur Psychotechnik der Schreibmaschine und ihrer Bedienung. *Praktische Psychol.*, 1921, 2.

A systematic investigation of typewriting, the first of its kind in Germany, was undertaken at the instigation of the Prussian Department of Commerce under the immediate direction of the Institute of Business Psychology at the Commercial College in Berlin. In the present study thirty-six girls between the ages of fourteen and seventeen were used as subjects. Twenty-four of these were being trained as touch operators, twelve as sight operators. The study covers a period of twenty weeks with a total of one hundred and sixty hours of actual practice. Performance graphs show that the sight students did faster work in copying during the first ten days, after which they were gradually surpassed by the touch operators. The difference between the two groups was maintained until near the end of the study when the sight operators almost overtook the touch operators. A study of greater duration will be necessary before the final outcome can be determined.

A further study made with five groups, totaling one hundred subjects, was made in which it was discovered that the performance

of the right hand was only eighty-four and three-tenths per cent. ($84\frac{3}{10}$ per cent.) as efficient as that of the left hand. The distribution of the letters copied was such that it was possible to determine exactly how much work was done by either hand. It was also discovered that words in which the letters go from one hand to the other only once or twice can be written more quickly than words which require more than two changes between both hands. It was concluded that the chief handicap of touch operators is the weakness of the fourth and little finger, a weakness which does not seem to be overcome readily even with considerable practice.

LINK (New York)

363. SCHORN, M., Begutachtung von Reklameplakaten und Inseraten. 1. Versuch einer objektiven Bewertung von Reklameplakaten. *Praktische Psychol.*, 1921, 2.

This study defines the two chief objects of the applied psychologist in the field of advertising as: (1) The development of a technique which will make it possible to study the sales value of particular advertisements. (2) The expression of the results of such a study or studies in numerical terms. The present article describes three studies made under the supervision of W. Moede in which these two purposes were kept definitely in mind. The advertisements in question were shown to a heterogeneous group of forty-five people, for a period of two minutes, and each individual was then asked to report what he had seen. The elements mentioned were then enumerated, and the frequency with which they were mentioned was computed in terms of percentage and plotted graphically. By this method it was made possible to determine the relative value of the various elements in the advertisements used, and to determine whether the suggestions which the advertisements were intended to convey actually received the desired attention. With the advertisements in question it was found that the most frequently mentioned elements were those of secondary importance from the standpoint of the advertiser whereas the principal ideas which the advertisements were meant to convey were among those least frequently mentioned.

Supplementary but less objective methods used in connection with the same advertisements substantially confirmed the results obtained by the numerical method described.

LINK (New York)

364. MINER, J. B., Standardizing Tests for Vocational Guidance. *Sch. and Soc.*, 13, 1921, 629-633.

Miner discusses two phases of the problem of standardizing tests in order to make them useful for vocational placement: (1) Measurement of the occupational types. (2) Measurement of most stable workers within an occupational group. He shows how types of sales ability may be differentiated by means of an intelligence test similar to Army Alpha. The central tendencies and the quartiles for the groups tested are as follows: (1) Counter salespeople (one-priced articles), 36, 57, 70; (2) wholesale salesmen to local retail stores (order takers), 59, 89, 121; (3) insurance salesmen, 82, 112, 138; (4) salesmen requiring training at a technical college, 124, 139, 155. The range of possible scores in the test is from 0 to 184. Not only must we place the individual in the occupation for which he is best fit, but we must also take into consideration his standing in the tested aptitude for that occupation insofar as this is prognostic of his stability at that work. Those who do not remain in an occupation may have shown the greatest aptitude or the poorest aptitude, depending on the occupation.

FREYD (Boston Psychopathic Hospital)

365. ADAMS, H. F., The Effect of Climax and Anticlimax Order of Presentation on Memory. *J. of Applied Psychol.*, 4, 1920, 330-338.

The question whether the order in which the mixed sizes were presented to the subject had any effect upon the memorability of the series. "If a firm advertises four times with mixed sizes of advertisements, is it more effective upon memory to present the larger-sized advertisements at the beginning or end of the series?"

Dummies were prepared and used by 463 subjects. It is concluded that the anti-climax order is more effective than the climax order.

E. MULHALL ACHILLES

366. OTIS, A. S., The Selection of Mill Workers by Mental Tests. *J. of Applied Psychol.*, 4, 1920, 339-341.

Four hundred employees were tested in a mill. The conclusion drawn is that intelligence is not only not required in a modern silk mill for most operations but may even be a detriment to steady efficient routine work. What qualities are required remain to be sought. Whether they are measurable is doubtful. They may be stolidity, patience, inertia of attention, regularity of habits, etc.

E. MULHALL ACHILLES

367. ROBACK, A. A., and GROETZINGER, M., The Applied Psychology of Names. *J. of Applied Psychol.*, 4, 1920, 348-360.

The question asked is, "Is there any general rule that can be applied as to the way the combination of names should appear in advertisements, on letter-heads or in any form of publicity?" The data indicate (1) that a combination of names possesses a greater immediate memory value if the more familiar component of the combination appears last, and the less familiar first; (2) other things equal, the unfamiliar element shows a greater memory gain than the familiar component. This suggests that eventually the unfamiliar will become a more effective stimulus than the latter.

E. MULHALL ACHILLES

368. MUDGE, E. L., The Common Synaesthesia of Music. *J. of Applied Psychol.*, 4, 1920, 342-345.

E. MULHALL ACHILLES

8. SPECIAL MENTAL CONDITIONS

369. DE SANCTIS, S., I metodi onirologici. *Riv. di Psicol.*, 16, 1920, 1-30.

The author discusses the methods for the study of dreams. He insists that the scientific method for their study is the same as that employed in general and differential psychology,—namely, introspection. Introspection may be of two sorts: auto-introspection or the testimony of the subject, or hetero-introspection which is induced. Both procedures must be controlled by external observation and experiment. Auto-introspection is the method employed by Freud and the author discusses a number of factors, such as the improvement in remembering dreams with practice. The author discusses the results of recording his own dreams. The hetero-introspective method seems to be important for bringing to light the affective aspects of the dreams. There follows a long laudatory summary of the work and methods of Freud. Among the experimental findings de Sanctis finds that it takes an appreciable time for the dream conscious to become fixed; that there does not seem to be any "immediate memory" for dreams. The work of the day before does not seem to influence dreams while, up to a certain point, it does influence sleep.

ELRINGTON (Washington)

370. RIGNANO, E., Una nuova teoria sul sonno e sui sogni. *Riv. di Psicol.*, 16, 1920, 31-41.

A new theory of sleep is advanced. The non-affective character of dreams is pointed out. The nervous elements involved in the intellectual processes during the day have intermittent periods of rest,—they are not active all of the time. Hence their activity can persist during sleep. The nervous elements underlying the affective processes (including attention and will) never rest during the day and, therefore, there is need for complete suspension of activity during sleep, in order that its energy may be restored. Dreams are described as being entirely devoid of feeling characters. They are apparently emotional but analysis discloses that only the somatic elements of the emotion are present. The rapidity with which dreams are forgotten and the incoherence and illogical character of them are also discussed.

ELRINGTON (Washington)

371. THOMAS, C. D., Newspaper Tests. *J. Soc. Psychological Res.*, 1921, 20, 89-107.

A discussion of a series of items termed Newspaper Tests covering a period from October 10, 1919, to February 4, 1921, giving a numerical analysis of 53 of the tests.

BROOKE (Pennsylvania)

372. BAGBY, E., The Psychological Effects of Oxygen Deprivation. *J. of Comp. Psychol.*, 1921, 1, 97-113.

Under an authorization of the War Department to the Medical Research Board, in 1917, Lieutenant Bagby and his colleague, Lieutenant Isaacs, acting as assistants to Major Knight Dunlap, investigated the mental and behavior phenomena induced in aviators by the deprivation of oxygen in re-breathed air. The Henderson Re-Breathing Apparatus was employed. Twelve preliminary, control types of experiment were done, and consisted of tests of visual acuity, auditory acuity, reaction-time to changes of pressure, steadiness in aiming, rapidity of tapping, knee-jerk irritability, immediate and delayed memory of from five to nine consonants, memory of associated digits and color-names, visual memory of positions of colored lights, serial attention reactions, Dunlap's addition test of attention, and tactile discrimination and sorting of cards having different shaped openings. In these preliminary experiments the investigators were influenced by certain limitations,

such as the necessity of making rapid classifications of aviators involving not more than thirty minutes per man, the advisability of not using graphic records of results because of the length of time necessary for grading and statistical treatment and because in graphic records no means is afforded for the registering of compensatory reactions, the necessity of preventing fatigue by having short and easy tasks, the necessity of obtaining pulse and blood-pressure readings from the observer at two-minute intervals during the examination, requiring that the observer's left hand be free for the circulation tests and also that his mouth be free for gripping the mouth-piece of the re-breathing machine, leaving only one hand and both feet free for reactions, and the lack of pioneer work on which these investigators could rely. The preliminary experiments brought to light such results as the following: (1) The gradual depletion of oxygen produces tremor, muscular incoordination, and over-discharge, which effects grow progressively greater as re-breathing proceeds. (2) Low oxygen tension results in the diminution of the ability to carry on several discrete acts which involve a rapid shifting of attention, presumably because the distractibility of the observer is lowered instead of raised, with the consequent effect that simple, mechanical operations, done singly, are better executed than under normal air conditions, viz., simple sensory and motor acts. However, in the final stages of asphyxiation, concentration on any task is nigh impossible. (3) The muscular condition of the left hand, under normal conditions, was firm, but under conditions of oxygen deprivation became first relaxed, then tense, and finally twitchy. (4) Asphyxiation, in its earlier and later stages, seems to remove certain inhibitions or repressions in the observer, for he shows resentment to all stimuli and perhaps actually swears and tries to break the apparatus or becomes silly and winks and smiles at the experimenter and gives way to uncontrollable laughter. (5) After a preliminary effect of asphyxiation, the observer can pull himself together somewhat and can improve the quality of his reaction, and then he wants to rest and becomes oftentimes quite inert; this increased efficiency can be regarded as a true illustration of a "spurt."

The standard test which was devised and performed was planned to offset the "spurt" effects, to register at once decreased motor control, and to demonstrate the increasing restriction of attention, although not attempting to indicate the aviator's constitutional resistance to low oxygen tension. This standard test was very

complex in procedure as well as in the apparatus used, involving the presence of both physiologist and psychologist, both of whom were required to "be on the job," to properly control the experiment, to get down accurate and quick records, and to prevent serious results from asphyxiation and exhaustion. As in the preliminaries, the re-breathing apparatus and the apparatus for pulse and blood pressure were employed; in addition, elaborate and complicated sets of apparatus were worked by both the psychologist and the observed re-agent. The re-agent had three sets of tasks to attend to and to perform, tasks which the reviewer presumes were similar to the tasks the aviator must perform in all altitudes: to touch with stylus a certain button whenever a certain light appeared, to adjust by switch the amount of current in an ammeter to correspond to an indicated reading, and to adjust the speed of a motor to a prescribed speed by means of a rheostat arrangement worked by pedal by the re-agent's foot. An automatic distributor flashed the lights in sequence. The psychologist by his own rheostats and ammeters and switches varied the ammetric readings, and changed the speed of the motor, to stimulate the prescribed reactions in the re-agent. The psychologist also kept records, by an elaborate but ingenious set of symbols, of the reactions of the re-agent and jotted down data concerning the efficiency and the progress of inefficiency of his subject. After the data had been obtained a set of objective rules were followed as to the scoring, and tentative ratings, ranging from *A* through *C*, were applied to the results and the aviator received his rating. A standard period of 25 minutes, with 7 per cent. oxygen, representing the standards for the highest types of aviators, was employed and deviations in quality of reactions and the approach to collapse during this standard time and with 7 per cent. oxygen were used as bases for the rating.

The author tells us that the results of the preliminary experiments were verified on a score of psychological observers and that as many as 7,000 aviators have been submitted to the standard re-breathing test.

CROSLAND (Oregon)

373. FROEBERG, S., Effect of Smoking on Mental and Motor Efficiency. *J. of Exper. Psychol.*, 1920, 3, 334-345.

The difficulty in experiments of this sort is to avoid suggestion. To accomplish this an ingenious device was resorted to whereby

the alkaloid decomposition products, which are supposed to be the active agents of tobacco smoke, were filtered out, leaving the aroma of the smoke unchanged. In the unfiltered smoking apparatus absorbent cotton was used to equalize the "pull." There was little difference in taste between the filtered and the unfiltered smoke, but the filtered smoke was slightly less visible than the unfiltered. This enabled one subject to detect the difference, and necessitated the rejection of his records. Cigars were used, and the smoking period was approximately thirty minutes. Three motor tests and five association tests were used. The results from six subjects were included. There was a marked decrease in steadiness and coordination, but little difference in speed of movement. The association tests showed slight increases or decreases after smoking, but in only one case was the change as much as three P.E. Smoking, therefore, seems to have no definite effect upon the association processes of the normal adult.

BELL (New York University)

9. NERVOUS AND MENTAL DISORDERS

374. PORTEUS, S. D., A New Definition of Feeble-Minded. *Training Sch. Bull.*, 18, 1921, 7-10.

"A feeble-minded person is one who by reason of mental defects, other than sensory, can not attain self-management and self-support to the degree of social sufficiency," is the definition proposed.

E. MULHALL ACHILLES

375. MOTT, F., The Influence of Song on Mind and Body. *J. of Ment. Sci.*, 1921, 67, 162-172.

It was observed during the Great War that musical memory usually returns earlier than other forms of memory in cases of shell-shock amnesia. Stammerers and stutterers can frequently sing without an appearance of their defect. Words associated with music are more stably organized in the mind owing to the musical origin of language. Two psychological laws of association, contiguity and similarity, probably account for this fact.

Herbert Spencer concluded, like Diderot, that the cadences used in emotional speech afford the foundation from which music has been developed. Darwin concluded that musical notes and rhythm were first acquired by the male and female progenitors of mankind for the sake of charming the opposite sex.

It is probable that an inarticulate language of emotion preceded articulate language. It is consequently dependent upon a more stable preorganised mechanism, represented in both halves of the brain, while articulate language has its center on one side of the brain only.

There is a close similarity of emotional language between the men of all races, past and present.

Music arouses in us various emotions, but, according to Darwin, not terrible ones of horror, terror, or rage. Music reacts on the collective or group mind as well as on the individual and its beneficial effects in peace or war become contagious.

The author takes up the history of song in Britain; the Bards, the folk songs, songs of the Elizabethan period, and lyric songs.

He says that the quality of the voice is inherited, while articulate expression, like handwriting, is acquired by imitation.

Voice production in singing can be used to excellent advantage as a general hygienic and educational measure. This has been proved by the author's experience at the Maudsley Neurological Clearing Hospital.

LEAMING (Pennsylvania)

376. DEVINE, H., A Study of Hallucinations in a Case of Schizophrenia. *J. of Ment. Sci.*, 1921, 67, 172-186.

This is the history of a case of schizophrenia which for a year remained inaccessible and then suddenly began to talk freely of his hallucinations. The method of study was purely conversational.

The patient had hallucinations for 18 years. He heard voices which commanded him to do various things. He attributed these voices to supernatural powers which he termed "Immortal Strengths."

The author says that the problem of hallucinations may be approached at the outset by regarding them from the point of view of mental dissociation. Certain mental processes occur which the individual does not recognize as his own. They come into consciousness unbidden and the individual is unable to regulate control them. In some cases hallucinations appear to consist of isolated, unsystematized and fragmentary mental elements. In other instances they are highly organized into a system which produces a veritable duplication of personality. This case belonged to the latter category.

went "rolling around in his brain." This power was not a beneficent one, however. These "Strengths" were utterly evil, mocking

The "Immortal Strengths," in this case, assumed the rôle of an elderly-father-bishop sort of personality which the patient said spirits, without a single redeeming feature. They imposed extremely complex penalties on the patient not because of their disapproval of his actions but to gratify their own delight in the infliction of punishment.

The author states that the whole symptom complex in this case would seem to be the reaction to a perverted organic need and the clinical facts suggest that the primary disorder is much more probably to be located in the autonomic system than in the brain.

LEAMING (Pennsylvania)

377. READ, C. S., Familial Care of the Insane. *J. of Ment. Sci.*, 1921, 67, 186-195.

A description of the administration of familial care of the insane in the Colony of Gheel, Belgium, together with a brief history of its establishment and existence for some hundreds of years.

The main features of the Gheel system are: (1) Its naturalness as compared with that of public asylums. (2) The personal liberty which is enjoyed by the patient, and which must condone so largely to his happiness and contentment. (3) The superior economy in treatment. (4) The economisation of the labor of patients for their own benefit medically and for those who support them pecuniarily. (5) The constant association of the insane with the sane and the humanizing influence of the association of women and children. (6) The diffusion of the insane in separate dwellings as contrasted with barrack life in asylums. (7) The good effect toward recovery and the tendency to obviate early and advanced dementia. (8) The recognition of the important principle of individuality in treatment.

LEAMING (Pennsylvania)

378. BRYCE, W. H., Some Considerations in Psycho-therapy. *J. of Ment. Sci.*, 1921, 67, 195-205.

The whole question of the position of psycho-therapy at the present moment is rather difficult, not as to results of treatment, but because of an absolute want of coordination amongst the various schools.

Sidis says fear is everything. Freud says sex is everything. Adler says the feeling of inferiority is everything. Jung apparently postulates no one basal ultimate cause, but uses the conception of our divertible life-force or energy.

The next course will be either for one school to remain predominant, absorbing the others, or for an amalgamation to take place, embracing as much from each as has stood the test of utility; and "It almost seems," says the author, "as if the latter will be the contribution of this country to analytical psychotherapy."

LEAMING (Pennsylvania)

379. MONRAD-KROHN, G. H., On the Possibility of a Biological Conception of so-called Functional Nervous Disorders. *J. of Ment. Sci.*, 1921, 67, 205-209.

The aim of the article, as stated by the writer, is "to prove that the distinction between organic and functional nervous disorders is unfounded and misleading and to show that a biological conception of the functional disorders is possible."

He mentions the fact that *intra-vitam* biochemical methods are only in their infancy and says that functional nervous disorders rarely lead to early death, thus infrequently affording post-mortem investigation. Although the central nervous system is not accessible for direct inspection *intra-vitam* it is not impossible that changes of a transitory organic nature take place in its different parts.

He concludes, "We arrive, then, at the conclusion that the 'functional' disturbances are in all probability dependent on transitory, high-level lesions of organic nature; that these may possibly sometimes be the result of faulty functions (thus indirectly the result of psychic influence) but probably more often not; that suggestion in these cases is but a form of re-education; and that thus there is no fundamental gap between functional and organic disorders."

LEAMING (Pennsylvania)

10. INDIVIDUAL, RACIAL AND SOCIAL PSYCHOLOGY

380. WRIGHT, W. K., McDougall's Social Psychology in the Light of Recent Discussion. *J. of Philos.*, 1921, 18, 141-151.

This book has reached its fourteenth edition and is proving to be as important in this science, so the reviewer thinks, as was

James' work in general psychology. There are three "nodal points" in the conception of Social Psychology, viz., instincts, sentiments, and development of character and volition. Thorndike's viewpoint is evidently mechanistic and he certainly can have little sympathy with the psychological and philosophical positions held by McDougall. Woodworth says that McDougall's system does not account sufficiently for good will, comradeship, and co-operation of equals. The reviewer, however, believes the only serious omission in McDougall's list has been indicated by Wallas and that is a lack of regard for desire for knowledge and intellectual interest in general.

GARTH (Texas)

381. New Jersey's New Institution. *Training Sch. Bull.*, 18, 1921, 27.

The Trustees of the Baron de Hirsch Fund which formerly maintained an Agricultural College at Woodbine, N. J., about sixty miles south of Philadelphia have given the institution to the State of New Jersey. It is purposed to make this a colony for male idiots and imbeciles.

E. MULHALL ACHILLES

382. ELDERTON, E. M., On the Inheritance of the Finger-Print. *Biometrika*, 1920, 13, 57-91.

The finger-print data collected by Galton has been submitted to statistical analysis in accordance with biometric methods of attacking inheritance problems, after an attempt to interpret it from the Mendelian point of view. But one may suspect that such an attempt betrays some degree of incapacity to work from the Mendelian point of view, when the nature of the data is taken into account. The standard methods of classifying finger-prints, followed in the main by the author, appear to be based upon logical rather than morphological considerations and the results, though indicating an approximate agreement with results from other biometric studies of inheritance, are not wholly convincing.

BROWN (Michigan)

383. BUXTON, L. H. D., The Inhabitants of the Eastern Mediterranean. *Biometrika*, 1920, 13, 92-112.

A study of cephalic, upper facial and nasal indices and stature and pigmentation data leading to the conclusion that for the most

part the people of the Eastern Mediterranean represent a combination "probably of comparatively early date of Alpine and Mediterranean both of which stocks are found sporadically in a comparatively unmixed state in some parts of the area."

BROWN (Michigan)

384. MURCHISON, C., College Men Behind Prison Walls. *Sch. and Soc.*, 13, 1921, 633-640.

Out of 3429 white male criminals examined in the penitentiaries of Ohio, Indiana, and Illinois, 72 were college men, whereas according to chance there should not have been more than 25. These college men averaged 155 in Army Alpha, the best score being 205. Their average age was six years greater than that of the rest of the criminals. They committed a smaller variety of crimes than the rest of the criminals. They were more stable in their interests than other college men and criminals. Their average earnings before conviction were about twice those of all the other criminals. They did not tend to commit crimes of violence, but committed more than their share of crimes against the laws of nature and crimes of cunning and deceit. More than half of them were clerks, musicians, and salesmen, whereas these occupations are represented by only 14 per cent. of the graduates of Miami University. Murchison accounts for the large percentage of college men in these prisons by showing that college students are tending to take courses which would lead to cheap jobs as clerks or salesmen instead of to the great professions, and for this he blames the colleges.

FREYD (Boston Psychopathic Hospital)

385. STANLEY, L. L., Narcotic Drugs and Crime. *Jour. Crim. Law and Crim.*, 1921, 12, 110-115.

With the greater public attention which narcotic drug addiction has commanded since prohibition was established, clinics have been conducted in New York and certain other cities but with disappointing results. Hubbard is quoted from the New York Public Health Report to the effect that the clinic tended to increase the number of addicts, that death does not result from the sudden withdrawal of a narcotic drug from healthy adults, and that the suffering caused by the sudden deprivation is not as severe as may appear on the surface. Very few are known to be cured by ambulatory treatment which is described as vicious in principle and in effect. Self-administration is too harmful to be recommended

under any circumstances and if hospitals are available there is no excuse for drug dispensaries. The Harrison Law has a negligible effect in stopping the traffic. The British government maintains the opium trade and releases by auction each month thousands of pounds of opium. Smuggling on a large scale is repeatedly discovered at San Francisco. The writer suggests, in remedy, engendering shame in countries engaging in the traffic, government manufacture of opium, and world-wide international agreements to stop smuggling and promiscuous production.

KELLEY (Boston Psychopathic Hospital)

386. KEEDY, E. R., Criminal Responsibility of the Insane. A Reply to Professor Ballantine. *Jour. Crim. Law and Crim.*, 1921, 12, 14-34.

The writer defends a previous explanation of a proposed bill, criticized by Professor Ballantine, which provides against the conviction on a criminal charge of any person suffering from such mental disease that he did not have the particular state of mind that must accompany such an offense to constitute a crime; provides for a special verdict, if justified by the evidence, that the accused committed the offense but was at the time not legally responsible because of mental disease; and further, for an inquisition ordered by the court to determine whether the prisoner at that time is a menace to public safety, entailing commitment or immediate release according to the findings. Most crimes involve a mental state as an element thereof. This element varies with different crimes and includes general as well as specific intent; and anything which negatives this element is a defence to the crimes charged. The proposed statute is based upon the fundamental principle that crime has not been committed when the necessary mental element is lacking; embodies no medical or psychological theories; does away with legal definitions of insanity; assigns proper functions to the legal and medical professions; and in providing a practical test, obviates the introduction of special tests and terminology which becloud issues under the present system.

KELLEY (Boston Psychopathic Hospital)

II. MENTAL DEVELOPMENT IN MAN

387. Franzen, R. The Accomplishment Quotient. *Teachers Coll. Rec.*, 1920, 21, 432-440.

Urges the use of an accomplishment quotient, analogous to the Intelligence Quotient, for measuring and stimulating achievement in school. The argument is that a child of I.Q. 110 should surpass the norm for his age in reading, spelling, etc., by 10 per cent.

GATES (Teachers College)

388. RURL, B., Reconstruction of Mental Tests, *J. of Philos.*, 1921, 18, 181-184.

There is apparently considerable unrest among psychologists and others at work in the field of mental tests. We cannot ignore existing conditions which are due to inadequate instruction in statistics for students doing work in mental tests and to careless editing of psychological and educational periodicals. Approval must not be given to various statistical tricks which may at times be expedient but are nevertheless bad method. Practical efficiency must not be the criterion but those methods which can alone be genuinely productive in a scientific sense are the ones to seek. Neither must we ignore the necessity for analysis and isolation of variable factors which tendency finds its expression in the "omnibus" tests and the like. This point of view as well as concern only for the expeditious limits the possibility of significant contributions to psychological science from the mental test field. The best advancement in the field of mental tests cannot come if we consider mental testing a "technical science" and not a "descriptive science." It is better to contend that there be "no problem that does not test out an hypothesis," than otherwise.

GARTH (Texas)

389. DOLL, E. A., Mental and Physical Growth. *Training Sch. Bull.*, 17, 1920, 157-164; 18, 1921, 1-6.

The paper deals with the physical growth, mental growth and physiological explanations. The biological law of Montessori is accepted, "Growth is not only increase in volume, but is also an evolution in form." Her second law is also accepted, "The more essential parts vary less than the accessory parts in the course of their transformations."

The second part of the article is concerned with functional development—physiological, psycho-physical, educational, economic, and moral functions.

E. MULHALL ACHILLES

390. JOHNSTONE, E. R., On Institutional Management. *Training Sch. Bull.*, 17, 1920, 165-171.

The advantages of staff meetings in an institution are discussed.

E. MULHALL ACHILLES

391. JOHNSTONE, E. R., On Institutional Management. *Training Sch. Bull.*, 18, 1921, 28-31.

The advantage of an "Association" in connection with every institution—public or private—is explained. Persons who will give of time and interest are needed by any institution. Through an association the members feel it is their institution. They visit it, bring their friends and extend the influence of the institution to many others. It is urged that "Associations" such as the one Vineland has had since 1888 be formed in other institutions.

E. MULHALL ACHILLES

392. DOLL, E. A., Criminal Psychology. *Training Sch. Bull.*, 18, 1921, 17-26.

The psychological study of the criminals' intelligence is hardly more than ten years old. Most of the early studies which showed a relation between mental condition and crime were made by psychiatrists and therefore it is not unnatural that a relation was established between crime and constitutional mental defect of pathological nature. More recently the studies conducted by psychology have emphasized the place of intelligence in crime.

The thesis that a large amount of juvenile delinquency is the result of the defective judgment and feeble inhibition is established. It is unwarranted to imply that what is true of juvenile delinquency is also true for adult criminals. In the case of the adult criminals we must seek some other psychological factor than intelligence. A man may be a criminal because of physical constitutional inferiority, because of mental deficiency or because of personal defects.

E. MULHALL ACHILLES

393. ANDERSON, J. E., A Comparison of Two Methods of Giving the Number Series Completion Test. *J. of Applied Psychol.*, 4, 1920, 346-347.

The evidence from 85 cases of Yale freshmen is that the cross-out method of giving the number series completion test (as developed by Pressey) is superior to the regular completion method as measured by the criterion of correlation with college standing.

E. MULHALL ACHILLES

394. DERRICK, S. M., A Comparative Study of the Intelligence of Seventy-five Whites and Fifty-five Colored College Students by the Stanford Revision of the Binet-Simon Scale. *J. of Applied Psychol.*, 4, 1920, 316-329.

Seventy-five white college students were tested in the University of South Carolina. Fifty-five colored students were tested at Benedist College and Allen University. *Due to the scarcity of colored college students*, a few colored men in two upper classes of high school were tested. The white students ranged in chronological age from 16 to 25, range of I.Q. 91 to 128, average 112; the colored men ranged in chronological age from 16 to 35, range of I.Q. 76 to 125, average 103. A short bibliography is appended.

E. MULHALL ACHILLES

395. GIBSON, S. M., A Decision Study of 150 Young Men and Women. *J. of Applied Psychol.*, 4, 1920, 364-374.

Seventy-five men and seventy-five women were given a Decision Test, the decision and the time of decision for each item was recorded. The "decisions" were classified into four grades. Each group of subjects took more time for decision on harder situations than on easier ones. The average time for women is greater than for men, the women had fewer mistakes than the men. On Grade I only one mistake occurred among the women and seven among the men; Grade II women 16 mistakes, men 32; Grade III women 83, men 99; Grade IV women 135, men 164. The mistakes were distributed through most of the groups—72 men, 71 women.

The correlations indicate higher accuracy with slower times and higher ratios, and lower accuracy with quicker times and lower ratios.

E. MULHALL ACHILLES

396. GORDON, E., and BAKER, H. J., Intelligence Tests and Academic Standing. *J. of Applied Psychol.*, 4, 1920, 361-363.

Forty-four college students taking courses in elementary psychology were given the Stanford revision of the Binet test and the correlation of the I.Q. and grade in other subjects was obtained. The coefficients tend to be positive, but low.

E. MULHALL ACHILLES

397. DOLL, E. A., *The Growth of Intelligence. Psychol. Mono.*, 1920, 29, No. 2, 130 pp.

Doll here presents the first thorough investigation yet made of the growth of intelligence. The original data were obtained by applications of the Binet scale, chiefly the Goddard revision, through a period of ten years at the Vineland Training School. The literature of intelligence testing and the data of other investigators have been freely drawn upon. The report consists of a theoretical discussion of the problem; data and their interpretations concerning feeble-minded and superior children; a critique of the I.Q.

The preliminary discussion suggests serious modifications of the accepted curve of intellectual growth, and presents tentative curves for average normal, feeble-minded, and superior cases. 13.5 years is suggested as superior to 16 years for the average adult level of intelligence.

Data are presented for 203 cases of feeble-minded subjects tested at intervals through a period of 3 to 8 years. Objective rules are developed and followed for scoring incomplete examinations. Conclusions are drawn that feeble-minded subjects reach their final age of arrested mental growth before 15 years of life age; that this age of arrest is a function of the final mental level attained; that the rate of growth prior to the final level of arrest is a decreasing variable and is a function of life age.

Superior children show great individual variability in their rates of intellectual growth. Between the life ages of 9 and 13 their rate of growth is low when mental age and degree of acceleration are high, and vice versa.

In the case of normal individuals, Doll's final theoretical growth curve shows an increasing rate of growth from birth to life age 7.5, and a decreasing rate of growth from 7.5 to 13.5, when the adult level is reached. This curve is supported more by theoretical considerations than by experimental data.

The I.Q. fails in revealing significant changes in rate of growth. Terman's contention that the I.Q. is approximately constant for life ages 4 to 16 is vigorously attacked, and its usefulness as a measure of prognosis is challenged. It is contended that there is no sufficient means of prediction of intellectual growth in advance of repeated examinations.

The most valuable features of this study are the theoretical discussion of intellectual growth, the mass of data on the feeble-

minded, and the critique of the I.Q. The attack upon the constancy of the I.Q. in the case of normal individuals needs experimental justification. This research should stimulate further investigation in its field.

PECHSTEIN (Rochester)

398. REAMER, J. C., *Mental and Educational Measurements of the Deaf. Psychol. Mono.*, 1921, 29, No. 3, 130 pp.

After devoting some time to the history of the education of the deaf and psychological investigations with regard to the deaf, Reamer directs attention to the standardization of tests, employing both a non-language or mental scale, and an educational scale, all these being adaptations of well-arranged and standardized scales. Children in fifteen state institutions and eleven public day schools are given the two tests, with statistical results being computed largely in percentile form. Mental and educational indices are struck. Marked differences between the two point out individuals or schools either making proper use of the mental calibre of pupils or wasting good material. Charts for the use of teachers and superintendents of the blind are drawn up, and considerable comparison is made of manual and orally taught blind students, the congenital deaf and the adventitiously deaf, partial and totally deaf, etc. No significant sex differences either in mental ability or educational attainment are found between deaf boys and deaf girls. The average difference in mental ability between hearing and deaf children is found to be about two years; in educational ability, the deaf child is retarded about five years when compared with the hearing child, with an average grade retardation of about three and a half grades. The mental and educational retardation is assigned to the language handicap.

This monograph is of extreme value for teachers of the deaf and, paralleling the work of Best and Hint for the blind, furnishes valuable chapters in the psychology of the sense organ deprivattee.

PECHSTEIN (Rochester)

399. ROOR, W. T., *A Socio-Psychological Study of Fifty-three Super-normal Children. Psychol. Mono.*, 1921, 29, No. 4, 134 pp.

The investigation aims to trace out some of the factors, both social and psychological, found with a group of children purported to be superior. The psychological aim calls for the employment of

the Stanford Revision of the Binet test and a large number of psychological tests, with an endeavor to determine the mental differences marking the superior child. The social aim demands the evaluation of the cultural conditions of the home, social and educational factors which have been operative in producing a superior type of adjustment, all in the light of school data and health data. Children from seven to twelve years with I.Q.'s of 135 or more were required, as well as thirteen to fifteen years with I.Q.'s of 120 or more. Control groups were established. The superior group surpasses the normal group both in the Binet and psychological tests, these tests correlating .778 for the superior group. Great individual differences among the superior children are shown, both in speed and accuracy. High quantitative scores tend to accompany high qualitative scores. Various character traits of endurance, zeal, critical attitude towards the work, etc., are shown. The superior children are moral to a high grade and are good conformists. The school records are excellent, superior health characterizes the group as a whole, and the home influences are unusually sound.

In endeavoring to account for the high I.Q.'s and mental ages, the writer is of the opinion that, "given average native ability, a sum total of factors, consisting in superior training, health, social milieu, etc., could readily inflate practically all performances; that superiority of the present group in health and in certain phases of training and environment is in most cases a fact beyond dispute, while native ability much beyond average is a matter of speculation." He doubts whether there is anything in the nature of any of the tests used to warrant assertion of superiority beyond immediate cleverness. He conceives genius as possessing merely the same characteristics we all possess, only in a markedly superior degree; and while it seems to him that the evidence warrants attributing some superior innate ability to a very great majority of the cases presented here, more than that he cannot say. Genius is conceived as being the result of a peculiarly fortunate blending of ability, temperament, character, opportunity and the stamp of social approval.

The monograph makes sane and stimulating reading for psychologists not already too overburdened by the extensive literature so rapidly appearing in this field.

PECHSTEIN (Rochester)

400. GARRISON, S. C., Fluctuations of Intelligence Quotient. *Sch. and Soc.*, 1921, 13, 647-648.

The Binet-Simon test (Goddard revision of 1911) was given to 94 children in the third, fourth, fifth and sixth grades in 1917-18. Three years later 62 of these children were retested by the Stanford revision. These children are from the better classes, and form rather a selected group. An error of one or two points is present in most of the I.Q.'s from the first test, because exact dates on which tests were made are not available. The examiners in both series of tests had practically no previous experience in testing. The chronological ages, mental ages and I.Q.'s from the two series of tests were compared, showing the I.Q.'s in the later case to average 1.4 points higher than in the former, with an average difference of 4.66 between the I.Q.'s for the two dates. It was found that most of the large differences occur with very high or low I.Q.'s. In the higher ages a greater difference was found between the results of the two tests. "These two facts may be partially explained by the fact that the upper ages in the Goddard revision of the test are unreliable. For the ages where both revisions are reliable, there is a rather close correlation."

GAW (Boston Psychopathic Hospital)

401. MADSEN, I. N., Some Results from a Testing Program in Idaho. *Sch. and Soc.*, 1921, 13, 668-671.

The report is concerned with the results of three types of mental tests, *i.e.*, (1) Haggerty Intelligence Examination, Delta 2; (2) Monroe Silent Reading; and (3) Monroe Arithmetical Reasoning Tests; applied to three classes of Idaho schools, *i.e.*, larger and smaller city schools, and rural schools. The tabulation shows higher scores for the larger as compared with the smaller city schools in the first and second tests. The results of the reasoning test, however, tend to favor the smaller city schools. No rural school figures are given for the Haggerty. In the other two tests the rural schools rank somewhat below the other two classes. Study of age-grade distribution has been found valuable in reclassification. In general, the results focalize the question whether the reported differences may be essentially due to environmental or mentality differences, or both.

NEWHALL (Wesleyan)

402. MYERS, C. E., MYERS, G. C., and LAYTON, S. H., Group Mental Testing in Altoona, Pa. *Sch. and Soc.*, 1921, 13, 624-628.

The Myers Mental Measure has been given to 6,774 elementary school children of Altoona, Pa., in an endeavor to show the individual differences existing among them. The struggle in the past has been for uniformity in teaching and disciplinary methods. It is now realized that every child is different, and that for his adjustment in the school accurate diagnosis of capacity and interest should be made.

That this test is of value in measuring the learning capacity of children is proved by the results of the survey. Only 19 of the 6,774 children failed to score. It is shown that for comparing grades and school systems, the raw score is more desirable than the intelligence quotient, while for classification within each grade, the intelligence quotient is the more desirable. Tables are made showing that the older children in the upper grades are of relatively low intelligence, that the farther on in a grade a given child of a given age has progressed, the higher will the rating be, and that the older a child is within a given grade, the lower will his intelligence quotient be.

Some recommendations made are that opportunity classes be organized for the subnormal and supernormal children, that the intelligence quotients of all entering children be determined, and that promotions take place as often as necessary for each child.

PROUTY (Wellesley)

403. BELL, J. C., Group Tests of Intelligence. An Annotated List. *J. of Educ. Psychol.*, 1921, 12, 103-108.

The author presents a bewildering array of group tests of intelligence (thirty in all) that have been published within the last two years. Most of these tests are named after the authors, although in some cases there are Greek letter, names of cities and names of states. A cursory examination suggests that the content of all of them is very much alike. There is a real need for comparison, analysis and evaluation of this material.

POFFENBERGER (Columbia)

404. FREEMAN, F. N., The Interpretation and Application of the Intelligence Quotient. *J. of Educ. Psychol.*, 1921, 12, 3-13.

"The purpose of this paper is to discuss the relationship between the I.Q. as a measure of the mental capacity of the individual and the facts of mental development." The I.Q. as a measure of ability fits the Binet scale. Its application to other tests rests on two

assumptions, namely, that the rate of mental development regularly decreases with advancing age and that the curves showing development of individuals of differing mental level diverge with advancing age. The writer presents evidence which casts suspicion upon the truth of both of these assumptions.

POFFENBERGER (Columbia)

405. PINTNER, R., and MARSHALL, H., A Combined Mental-Educational Survey. *J. of Educ. Psychol.*, 1921, 12, 32-43; 82-92.

To determine whether a child is accomplishing in school what his capacity warrants, to determine whether a school system is accomplishing the results that the intelligence of its students warrants requires that the mental and educational survey be combined. The authors predict that such a measure will show the greatest wastage among the better pupils and among the better schools. The use of a short educational test and a non-language mental test (elsewhere described) is discussed. A new measure known as "The Difference" expresses the relation between performance in the mental and the educational tests. "The correlation of the same group of cases between mental and educational indices is .62, which shows that on the whole educational attainment tends to go with mental ability, but that there is plenty of room for improvement, and therefore plenty of work for the psychologist to do in helping to adjust the child to the work he requires." The authors discuss the results obtained from the use of the combined mental-educational survey in 56 schools. Charts are presented showing how records are to be interpreted, in studies of classes, schools and school systems. Reasons are given for discrepancies between education and mental status, and remedies suggested for the various conditions.

POFFENBERGER (Columbia)

406. CHASSEL, C. F., and CHASSEL, L. M., A Survey of the Three First Grades of the Horace Mann School by Means of Psychological Tests and Teachers' Estimates, and a Statistical Evaluation of the Measures Employed. *J. of Educ. Psychol.*, 1921, 12, 72-82; 243-253.

This is an investigation of methods of classification and promotion in school grades, which should provide more homogeneous

groups. Five measures were employed, as follows: Individual examination (Stanford Revision), Pressey Primer Scale, Meyer Tests, and ratings by teachers in maturity and reading ability. The results of each of these tests were expressed in terms of mental age and a composite score was obtained by averaging these mental ages. The survey showed a wide range of mental age within any one division of the first grade, and much overlapping among the three divisions. It showed very clearly also the tendency to promote on the basis of chronological rather than mental age. The composite score was taken as the basis for formation of the three divisions of the first grade for the following year.

The methods of obtaining the composite score are discussed in detail, and the coefficients of correlation showing the relation among the five measures making up the composite score are given. The most interesting figure is the correlation of .77 between the Stanford Revision and the group tests and teachers' estimates combined. Does this mean that a group test and teachers' estimates may make individual tests unnecessary? A correlation of .72 between Stanford Revision and teachers' estimates might suggest a further reduction of the measure to teachers' estimates alone. Some importance is attached to chronological age, general health, nervousness, etc., in making grade assignments.

POFFENBERGER (Columbia)

407. KOHS, S. C., The Block-Design Tests. *J. of Exper. Psychol.*, 1920, 3, 357-376.

This article develops an interesting point scale of intelligence on the basis of a performance test consisting of block designs built up from the colored blocks manufactured by the Embossing Company. Seventeen designs of increasing complexity were used with a time limit on each varying from $1\frac{1}{2}$ to 4 minutes. The actual working time of the test is 30 to 40 minutes. Both time and moves are recorded, and the results are reduced to a single score by a system of points. The maximum score is 131 points. Norms (more or less theoretical?) have been worked out from 0 at five years to 131 at twenty years. The correlations between Binet scores and Block-Design scores range around .80 (a remarkably close agreement for different types of mental tests). The correlation between teachers' estimates and the Block-Design I.Q. is only one-half as high as that between teachers' estimates and the

Binet I.Q. The proposed test seems to be easily administered, easily scored, and capable of use in a large variety of different ways.

BELL (New York University)

408. DUNLAP, K., and SNYDER, A., Practice Effects in Intelligence Tests. *J. of Exper. Psychol.*, 1920, 3, 396-403.

A class of forty-four men, most of them college seniors, was tested four times at intervals of three weeks by four forms of the Army "Alpha" composite test. The second, third and fourth trials give nearly the same results, but these are from 20 to 50 points above the results for the first trial. The practice effect is much greater for the lower half of the class than for the upper. The scores on the fourth trial were uniformly slightly lower than those on the third. The authors account for this on the ground that the students were beginning to get bored with the testing. They showed this by the manner in which they took the test. It would seem, therefore, that in single intelligence tests the duller subjects are handicapped by the novelty of the situation much more than the brighter ones, and that as a result their scores are relatively much lower than they would be if a considerable amount of practice were afforded the entire group.

BELL (New York University)

409. STRATTON, G. M., McCOMAS, H. C., COOVER, J. E., and BAGBY, E., Psychological Tests for Selecting Aviators. *J. of Exper. Psychol.*, 1920, 3, 405-423.

The new tests reported in this article are for muscular strength and endurance, rapidity of complex reactions, judgment of curves, learning and recall of pathways, and judgment of relative speed. In the judgment of curves there is a tendency to overestimate the distance. The distribution of the scores is very wide. In the estimate of relative speeds an interesting illusion developed, in that the speed of the slower moving object was always overestimated with respect to that of the faster. The correlations between the tests and aviation ratings were positive, but very low. This was due partly to the variability of the test scores and partly to the fact that the aviation ratings were influenced to a considerable extent by military, personal, social and other considerations, that were not directly connected with ability to fly.

BELL (New York University)

410. DOUGLASS, C. E., Setting Up School Standards. *Educ.*, 41, 1921, 485-493.

"We cannot standardize, we cannot regulate (Hereditary Abilities), but if we are gifted with a modicum of common sense or scientific spirit we can and will classify and teach youth as it is, and not as idealized—we will educate what we get and not what we are supposed to have received." This article is a plea for school standards which ought to be determined "(1) by the educational aims, (2) by the demands of society as to the degree and the kind of proficiencies desired, (3) by the kind and degree of mental abilities of students."

"Social needs will determine both the kind and the degree of proficiency in the fundamentals which we should attain. In the acquisition of these tools of learning, scientifically derived standards give sane balance in subject-matter and method and leave the largest possible amount of time free for growth in the efficient use of these tools."

This article is a thoughtful presentation of the need of defining educational aims, which are related to social needs and which take into account practical considerations. Differentiation in the course of study, revision of teaching method and educational guidance, based on a knowledge of the pupils' capabilities, should make for a much better realization of our educational aims.

MAXFIELD (Harrisburg)

411. UHRBROCK, R. S., Vocational Psychographs. *Educ.*, 41, 1921, 510-515.

An inadequate treatment of the subject without originality or suggestion.

MAXFIELD (Harrisburg)

412. MULFORD, H. J., The Child Mind. *Amer. J. of Psychol.*, 1921, 32, 179-195.

The child-mind is to be understood in terms of its physical basis, the child-brain. The human brain is the seat of conflict between the Past and the Present, between heredity and environment, between reflex action and mind. An examination of the development of the brain through the various pre-human forms shows the path through which man's brain has developed. The child-brain is, in structure and activity, an animal brain, but it is

born to be developed into a man-brain. The child-mind, then, is a primitive mind, just as the child-brain is a primitive brain. In the development of the child-mind and the child-brain into a man-mind and a man-power brain, the two factors of heredity and environment are in conflict. The problems of the child-mind are a result of this conflict.

RICH (Pittsburgh)

413. ABBOTT, A., and TRABUE, M. R., A Measure of Ability to Judge Poetry. *Teachers Coll. Rec.*, 1921, 22, 101-127.

Two series of 13 sets, each set containing 4 poems, are presented, the merit of each poem being known from judgments of experts. Each series forms a measuring scale for ability to judge poetry. Data obtained by its use in schools and colleges are given.

GATES (Teachers College)

414. BRIGGS, T. H., KELLY, T. L., and others, Sixteen Spelling Scales. *Teachers Coll. Rec.*, 1920, 21, 337-391.

These authors have supplemented the Ayres List of one thousand words most frequently used in correspondence, by securing the second and third thousand. The words are printed with the frequency of occurrence on a basis of 100,000 running words. The spelling difficulty of each was determined by methods described and 16 lists of 20 words each, of equal spelling difficulty are arranged in sentences for spelling tests in high schools.

GATES (Teachers College)

415. McCALL, W. A., A Uniform Method of Scale Construction. *Teachers Coll. Rec.*, 1921, 22, 31-51.

The author proposed that the mean performance of twelve-year-olds be taken as a reference point and that - 5 S.D. be considered the zero point. The scale is then built up by the use of fractions of the S.D. of the twelve-year-olds as units. Various tables to assist in computation are presented.

GATES (Teachers College)

416. BRIGGS, T. H., An English Form Test. *Teachers Coll. Rec.*, 1921, 22, 1-12.

Two forms of a test consisting of 20 sentences each without capital letters, commas, apostrophes, and end punctuations. Standard achievements by pupils of Grades VII, VIII and IX are given.

GATES (Teachers College)

417. JUDD, C. H. Analysis of Learning Processes and Specific Teaching. *Elem. Sch. J.*, 1921, 21, 655-664.

Describes and recommends certain types of analytical work in studying the learning process in the case of school subjects.

GATES (Teachers College)

418. GRAY, W. S., The Diagnostic Study of an Individual Case in Reading. *Elem. Sch. J.*, 1921, 21, 577-594.

An elaborate study of a case of backwardness in reading by means of the photographic records of eye movements, and various educational and psychological tests. The remedial measures are described.

GATES (Teachers College)

419. GERMANE, C. E., The Value of the Corrected Summary as Compared with the Re-reading of the Same Article. *Elem. Sch. J.*, 1921, 21.

Students, Grades V-IX, recall from 4 per cent. to 20 per cent. more of an article when read and re-read than when the original reading is followed by writing summaries or outlines and checking these against the original.

GATES (Teachers College)

420. ANDERSON, C. J., and MERTON, E., Remedial Work in Silent Reading. *Elem. Sch. J.*, 1921, 21, 336-348.

Describes the use of standardized tests in locating the causes of backwardness in reading and various pedagogical devices for successfully remedying the difficulties, where ordinary instruction had failed.

GATES (Teachers College)

421. PRESSEY, S. L., An Attempt to Measure the Comparative Importance of General Intelligence and Certain Character Traits in Contributing to Success in School. *Elem. Sch. J.*, 1920, 21, 220-227.

By the use of the technique of partial correlations it appears that various traits described under "school attitude" influence school success about as much as intelligence. A rating scale for "school attitudes" is proposed. The study was based on 116 Seventh Grade pupils.

GATES (Teachers College)

422. PARKER, S. C., Problem Solving or Practice in Thinking. *Elem. Sch. J.*, 1920, 21, 16-25, 98-111, 174-188, 257-272.

A series of articles on the thinking process written especially for teachers. In Section I, the importance of problem solving in social life and its appeal to children's interests are considered. Samples of useful problems are given. Section II presents illustrative school lessons for stimulating thinking. Section III is a biographical study of how eminent men think they think. Section IV presents rules for training pupils in problem solving. The general treatment of thinking is very similar to that presented by Dewey in "How we Think."

GATES (Teachers College)

423. WIRTS, K. E., An Echo from One Special Class. *Training Sch. Bull.*, 18, 1921, 11-14.

Work in a special class of the Comenius School, Omaha, Neb., is described.

E. MULHALL ACHILLES

424. PRESSEY, S. L., Suggestions Looking toward a Closer Contact with Practical Problems in Work with Educational Tests. *Sch. and Soc.*, 1921, 13, 711-716.

The intention of this paper is to call attention to three current methods of statistical procedure whose applicability to educational tests is questioned. The first criticism is of the organization of an educational test, according to the difficulty of the items. Results from a test so organized are often interpreted as if child's understanding of the subject had been tested, whereas, actually, an item may have been hard not because it was important for understanding of subject, but because it was of so little importance the teacher did not stress it; or again it may have seemed easy because it was an item of common knowledge. The second criticism is of the use of the median or some other measure of central tendency for summarizing the results from a group. Methods of summarizing test data should take account of the fact that educational administration is interested in minimal requirements for passing rather than median achievement of a class. Comparison of schools as to passing point by means of tests would be of practical importance, whereas median score of a given class would be of but incidental interest. Finally, a statement of the standing of a given case in

terms of percentile rank, deviation from median, or otherwise in terms of the results on the same test is not nearly as helpful as would be some statement as to whether his score has in actual practise been made by pupils whom it was found desirable to pass. Method chosen should indicate for various scores the extent to which such scores have been earned by those prepared for the next grade.

LOWDEN (Boston Psychopathic Hospital)

425. THORNDIKE, E. L., The Constitution of Arithmetical Abilities. *J. of Educ. Psychol.*, 1921, 12, 14-24.

When the mental functions involved in arithmetical learning are reduced to their lowest terms, they are found to consist of elementary bonds or connections. The problem of teaching arithmetic becomes the problem of choice of bonds to be formed, the discovery of the best order in which to form them and of the best means of forming them. Numerous illustrations are furnished of the type of bonds required for the simple arithmetical operations. The formation of right habits (bonds) should precede,—and in the case of dull pupils,—supplant deductive reasoning, for with all save the brighter pupils, the bonds are more needed for an understanding of the definitions than the definitions are needed for the formation of the bonds. “The economical way to get an understanding of arithmetical principles is not, usually, to learn a rule and then apply it, but to perform instructive operations and, in the course of performing them, to get insight into the principles.”

POFFENBERGER (Columbia)

426. PRESSEY, L. W., and PRESSEY, S. L., A Critical Study of the Concept of Silent Reading Ability. *J. of Educ. Psychol.*, 1921, 12, 25-31.

“Is either the form or the content of the matter read an important conditioning factor in silent reading?” The tests of general silent reading ability are badly mislabeled, because the nature of the material read is a dominant feature in the situation. This is shown by a comparative study of four reading scales made from the material of current scales and representing general (two scales), scientific and poetry material. The highest correlation between scales (exclusive of the two general ones which gave a coefficient of .85) was .56 for the scientific and poetry material and the lowest was .31 for general material and poetry. The results of this study indicate a need for a reformulation of the silent reading problem.

POFFENBERGER (Columbia)

427. HENMON, V. A. C., An Experimental Study of the Value of Word Study. *J. of Educ. Psychol.*, 1921, 12, 98-102.

An experimental study was made of the effectiveness of an intensive study and analysis of words as compared with the regular high school work in English composition and literature. Two groups of students, one receiving the first and the other receiving the second form of training, were given 5 tests which should measure improvement in ability to use words discriminatingly, to define them accurately, and read difficult prose understandingly. The tests were Terman's Vocabulary, Thorndike's Visual Vocabulary, Trabue Completion Scale L, Thorndike's Intelligence Examination Part III, 1a and 1b, and a special list of 25 words. In all of these tests the word study group made better records. The author then raises the question as to the ultimate value of the two methods of training, finds it dependent upon what the purpose of courses in English is thought to be, and this in turn dependent upon one's educational philosophy.

POFFENBERGER (Columbia)

428. BURTT, H. E. Sex Differences in the Effect of Discussion. *J. of Exper. Psychol.*, 1920, 3, 390-395.

Münsterberg has stated on the basis of experimental evidence that men profit more from discussion of a doubtful objective situation than do women. As a by-product of another investigation the author offers interesting evidence on this point. In an experiment in which the subject lied or told the truth about an imaginary crime a group of persons judged his veracity by his observable reactions during the examination. After five minutes' open discussion a second judgment was made. Judgments were obtained from 156 men and 88 women. The men and women were members of the same college class. There was a considerable tendency to change one's decision as a result of the discussion, but the change was in the wrong direction about as often as in the right. There were no sex differences observed in the ability to profit by the discussion. There was a constant tendency to consider too frequently that the subject was lying. The author suggests that the difference between his results and Münsterberg's may be due to the fact that in the latter case the women were an unselected group of undergraduates, while the men were a selected group of graduate students.

BELL (New York University)

12. MENTAL EVOLUTION

429. WHEELER, G. C., The Phototropism of Land Snails. *J. of Comp. Psychol.*, 1921, 1, 149-154.

It had been stated by one investigator (Yung) that the structurally well-developed eye of the land snail, *Helix pomatia* L., is functionally blind, although at least one other previous investigator had believed that this species is phototropic. Wheeler set for himself the task of ascertaining whether or not the land snail, *Helix aspersa* Müll., prevalent in Georgia, is phototropic. Ten individuals were used in the experiment, but two of them were later disregarded, one being indifferent and the other being too sluggish for experimental work. A wooden box, painted black on its inside (situated in a dark room), contained suspended a 12-candle-power electric lamp; in front of the lamp, at a distance of 15 cm., there was a black card-board screen or diaphragm containing an aperture, 2.5 cm. in diameter, to admit light to the snail situated another 5 cm. beyond the aperture on a level with it. Between the lamp and the black screen was suspended a white sheet of paper whose function was to distribute equally the light through the aperture and on the snail. The axis of the snail's body was arranged perpendicular to the direction of the light rays. A turn toward the light was considered a positive tropism and a turn away from the light was considered a negative tropism; no movement, or a turn away and back again, or a turn toward the light and then away, were considered indifferent reactions. With all eight individuals, very definite and highly numerous negative phototropisms were found. In order to further substantiate his results, the investigator dissected both eyes from each of several individuals, and the blind individual at once became indifferent to the light. Then the experimenter dissected one eye, in some individuals the right, in other individuals the left; and, on the blind side, that is, when the blind side was toward the light, the organism was indifferent; and, when the good eye was toward the light, the organism became at once negatively tropic. Further experiments were conducted to find out whether or not these snails were being influenced by the heat emanating from the electric lamp; it was discovered that not only were they indifferent to the heat of the lamp but were also indifferent to a greater amount of heat transmitted into the box by a steam pipe for the purpose.

CROSLAND (Oregon)

